

Comparison of inclusive jets and dijets — ATLAS & CMS

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LHC EW WG – Jets and EW bosons

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Aim

Assess compatibility of different inclusive jet, dijet and b -jet measurements at 7 TeV.

Use Monte-Carlo calculations as transfer function to compare consistency of different measurements.

⇒ since different measurements use different fiducial phase space definitions, differences in description of different measurements may also stem from different levels of mismodelling in different phase space regions

Tools – NLOs

POWHEG+PYTHIA8

Alioli et.al. [arXiv:1012.3380](https://arxiv.org/abs/1012.3380)

- $\mu_{R/F} = p_T^j$ (underlying Born)
- NNPDF 3.0 NNLO
 $\alpha_s(m_Z) = 0.118$
- generation cuts
 $p_T^j > 15 \text{ GeV}$
- PYTHIA:
CUETp8M1 tune
w/ NNPDF 2.1 LO

⇒ **generated by H. Jung**

SHERPA (S-Mc@NLO)

Höche, MS [arXiv:1208.2815](https://arxiv.org/abs/1208.2815)

- $\mu_{R/F} = \frac{1}{4} H_T$, $\mu_Q = \frac{1}{2} p_T^j$
- NNPDF 3.0 NNLO
 $\alpha_s(m_Z) = 0.118$
- generation cuts
 $p_T^j > 15 \text{ GeV}$
- non-perturbative:
default tune
w/ NNPDF 3.0 NNLO

⇒ **generated by S. Kuttimalai**

still limited statistics,

use results of [arXiv:1012.3380](https://arxiv.org/abs/1012.3380) (where available) w/ CT10 NLO PDF here

Analyses

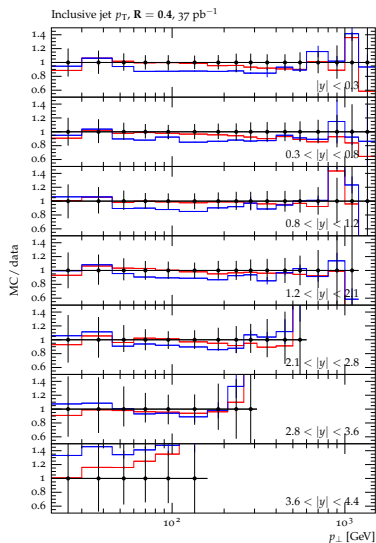
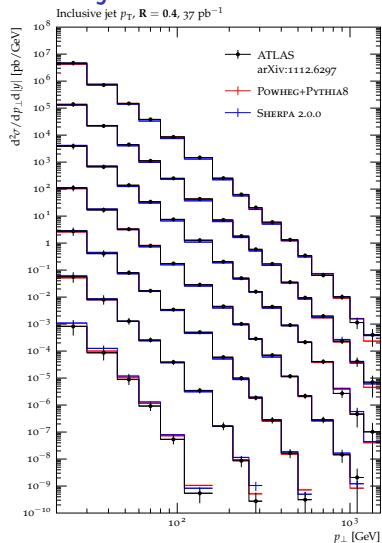
ATLAS

- inclusive jets
arXiv:1410.8857 (4.5 fb⁻¹, $R = 0.4, 0.6$, $p_T > 100$ GeV, $|y| < 3$)
arXiv:1112.6297 (37 pb⁻¹, $R = 0.4, 0.6$, $p_T > 20$ GeV, $|y| < 4.4$)
- dijets
arXiv:1312.3524 (4.5 fb⁻¹, $R = 0.4, 0.6$, $p_T > 100/50$ GeV, $|y| < 3$)
arXiv:1112.6297 (37 pb⁻¹, $R = 0.4, 0.6$, $p_T > 30/20$ GeV, $|y| < 4.4$)
- *b*-jets
arXiv:1109.6833 (34 pb⁻¹, $R = 0.4$, $p_T > 20$ GeV, $|y| < 2.1$)

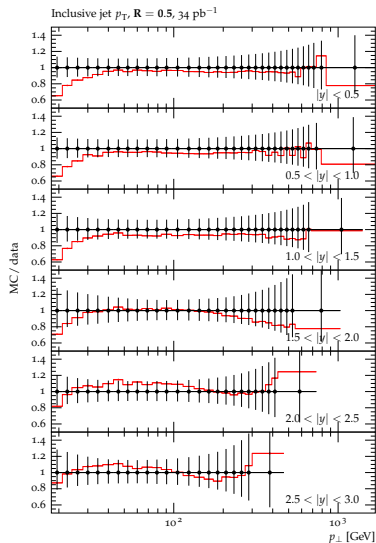
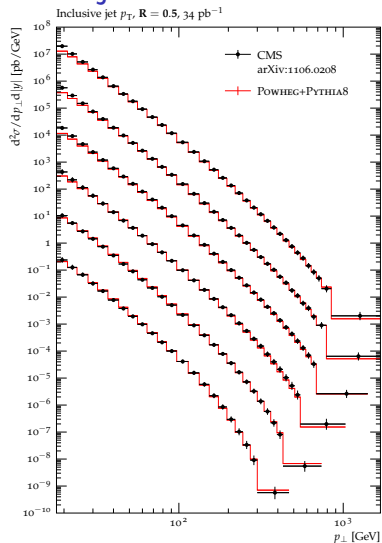
CMS

- inclusive jets
arXiv:1106.0208 (34 pb⁻¹, $R = 0.5$, $p_T > 18$ GeV, $|y| < 3$)
- *b*-jets
arXiv:1202.4617 (34 pb⁻¹, $R = 0.5$, $p_T > 18$ GeV, $|y| < 2.4$)

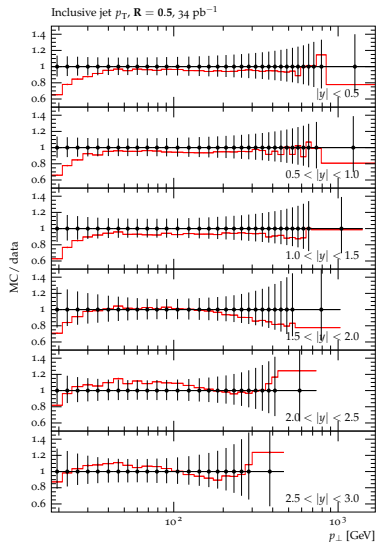
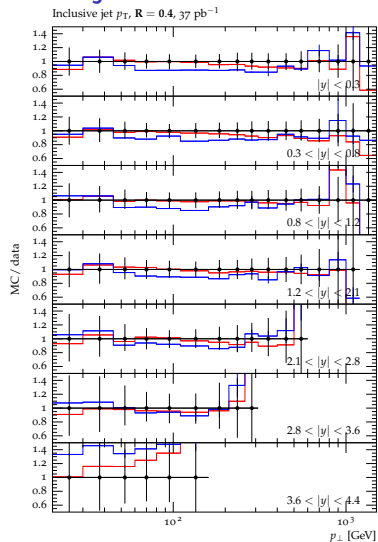
Inclusive jets



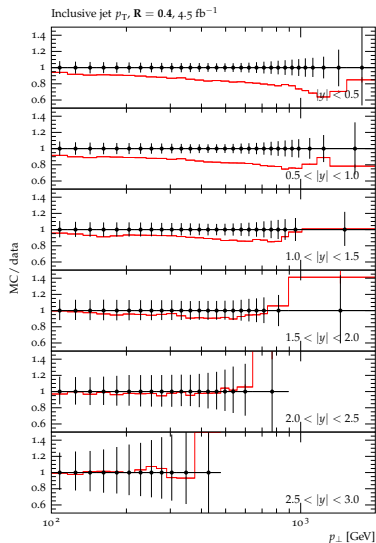
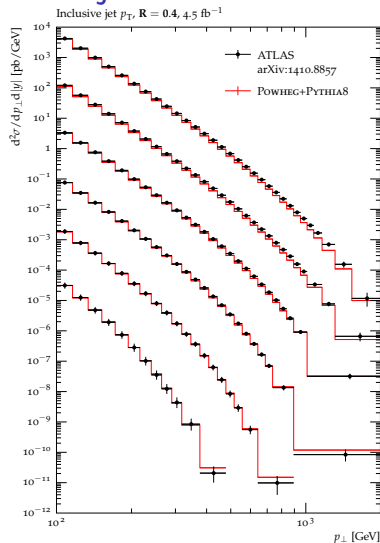
Inclusive jets



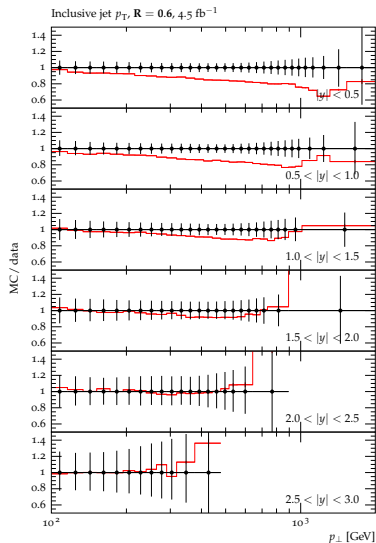
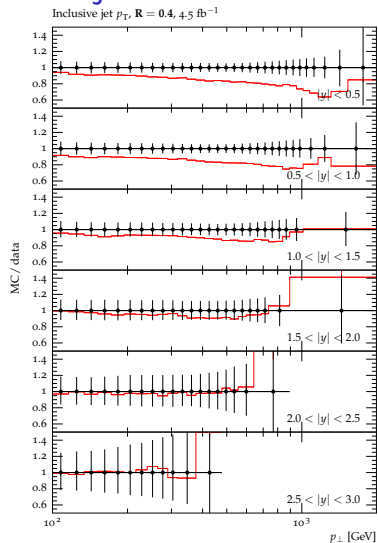
Inclusive jets



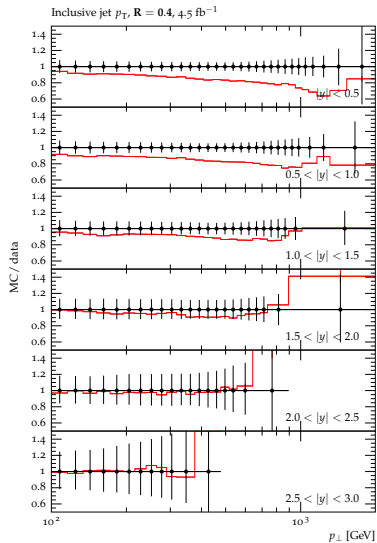
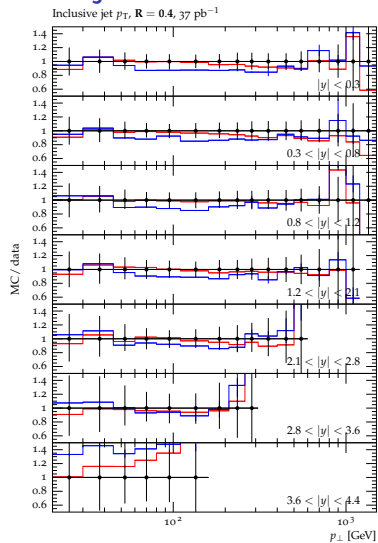
Inclusive jets



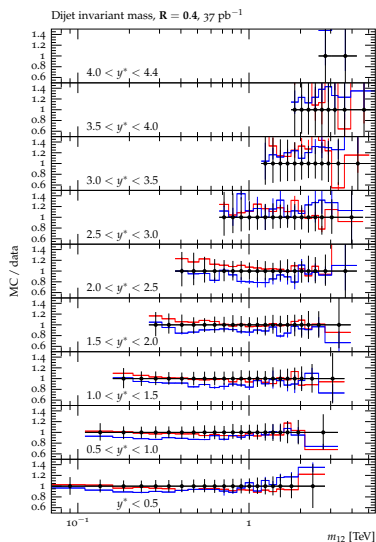
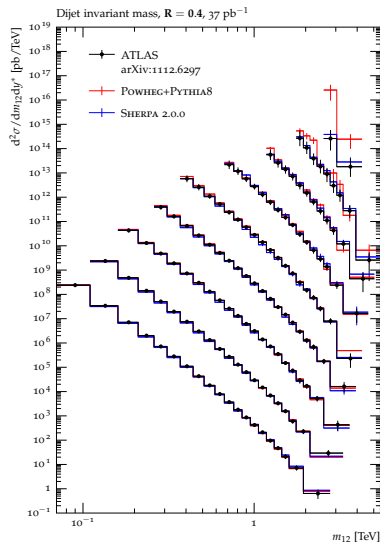
Inclusive jets



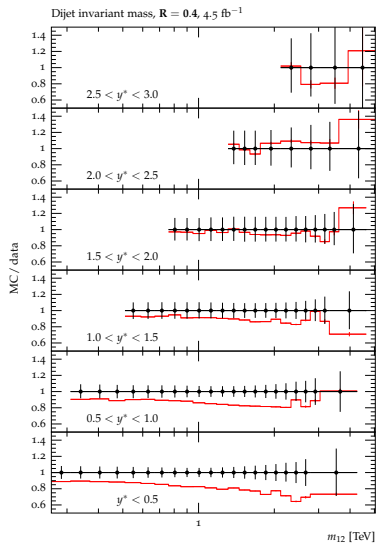
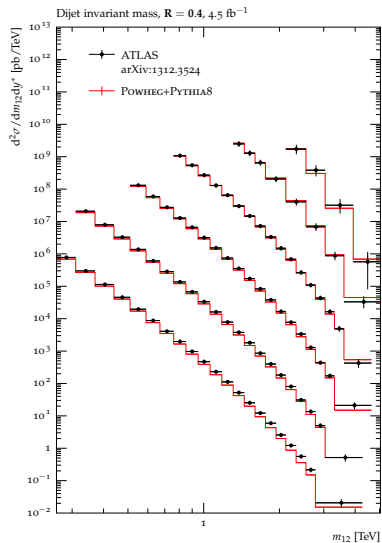
Inclusive jets



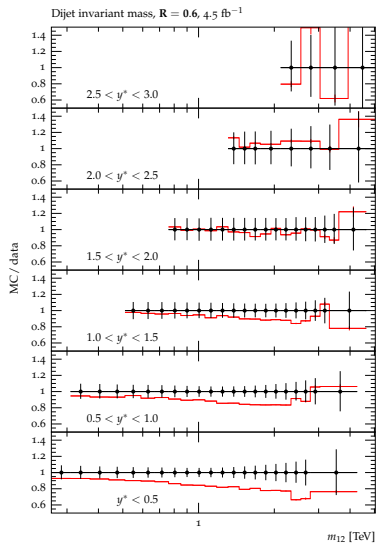
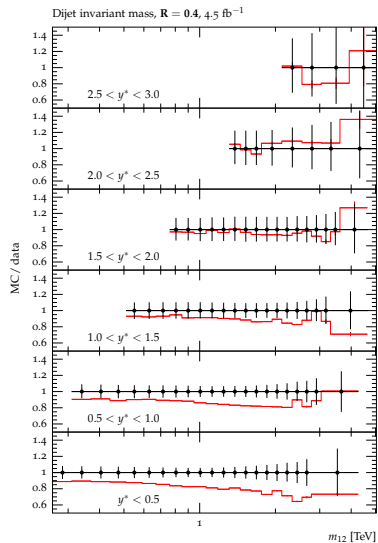
Dijets



Dijets



Dijets



Conclusions

- Monte-Carlo calculations used as transfer function to compare consistency of different measurements
⇒ **since different measurements use different fiducial phase space definitions, differences in description of different measurements may also stem from different levels of mismodelling in different phase space regions**
- ATLAS and CMS measurements seem consistent for inclusive jet p_T and dijet invariant mass spectra for low luminosity data
- systematic differences in ATLAS data between 37 pb^{-1} and 4.5 fb^{-1} , independent of jet radius
- no CMS results for full 7 TeV data set included
- no CMS results for dijet invariant mass included
- b -jet data also seems consistent between ATLAS and CMS

Full results [here](#).

Backup

POWHEG+PYTHIA8 settings

```
bornktmin 15d0 ! default 0d0
bornsuppfact 600d0 ! default 0d0
withnegweights 1 ! default 0
facscfact 1 ! default 1
renscfact 1 ! default 1
doublefsr 1 ! default 0
```

```
POWHEG:veto = 1
POWHEG:vetoCount = 3
POWHEG:pThard = 2
POWHEG:pTemt = 0
POWHEG:emitted = 0
POWHEG:pTdef = 1
POWHEG:MPIveto = 0
ParticleDecays:limitTau0 = on
Tune:ee = 7 ! Monash 2013 tune
Tune:pp = 14 ! Monash 2013 tune
tune CUETp8M1: CMS tune based on
NNPDF2.1LO
```